CLAIMS

1. Wavelet transform method of compressing digital image data, comprising a step of transforming digital image data into wavelet coefficients divided into sub-bands, a step of quantifying said wavelet coefficients, and a step of entropically coding said quantified wavelet coefficients, characterized in that it comprises, between the transformation and quantifying steps, a step of estimating, for each coefficient of each sub-band of the image, first and second sets of prediction parameters respectively associated with "North-South" and "West-East" directions as a function of the values of the wavelet coefficients of its North and West neighbors, and, in the entropic coding step, there is determined for each coefficient of each sub-band of the image a prediction of the esperance and the width of a Laplace type function representing its probability density as a function of said first and/or second sets of prediction parameters and the quantified wavelet coefficients of its North neighbor or its West neighbor and said quantified wavelet coefficients are coded entropically using the associated esperances and widths determined in this way.

2. Method according to Claim 1, characterized in that, in the entropic coding step, when it is possible, North and West esperance predictions and North and West width predictions are determined for the Laplace function of each quantified wavelet coefficient, said North, respectively West, esperance prediction being defined by the product of a first prediction parameter of the first, respectively second, set and the value of said North, respectively West, neighbor quantified wavelet coefficient and said North, respectively West, width prediction, being defined by the sum of a second prediction parameter of the first, respectively second, set and the product of a third prediction parameter of the first, respectively second, set and the absolute value of said North, respectively West, neighbour quantified wavelength coefficient.

3. Method according to Claim 2, characterized in that in the entropic coding step, firstly, in the absence of a North neighbor coefficient, the esperance and width predictions of the Laplace function are made identical to the West esperance and West width predictions; secondly, in the absence of a West neighbor coefficient, the esperance and width predictions of the Laplace function are made identical to the North esperance and North width

predictions; thirdly, in the absence of West and North neighbor coefficients, fixed Laplace coding is effected; fourthly, in the presence of West and North neighbor coefficients, the esperance and width predictions of the Laplace function are respectively made identical to the half-sum of the North and West esperance predictions and to the half-sum of the North and West width predictions.

4. Method according to any one of Claims 1 to 3, characterized in that the prediction parameters of said first and second sets are estimated by regression.

5. Method according to Claim 2 in combination with Claim 4, characterized in that said first prediction parameters of the first and second sets are estimated by a first regression obtained by solving a first equation $W[n+1,m] = \theta.W[n,m]$ where $W[n,m]$ is the value of a wavelet coefficient and $W[n+1,m]$ is the value of the neighbor wavelet coefficient $W[n,m]$, and θ is a first prediction parameter.

6. Method according to Claim 5, characterized in that said first equation is solved by the least squares method, said first prediction parameter of a first or second set being equal to the ratio between the non-normalized covariance and variance of the values of the wavelet coefficients associated with the first or second set.

7. Method according to Claim 2 in combination with any one of Claims 4 to 6, characterized in that said second and third prediction parameters of the first set are estimated by a second regression obtained by solving a first system of equations $|W[n,m] - \theta_N.W[n,m-1]| = \alpha_N + \beta_N|W[n,m-1]|$, where $W[n,m]$ is the value of a wavelet coefficient, $W_{n,m-1}$ is the value of the North neighbor wavelet coefficient of $W_{n,m}$, and θ_N, α_N and β_N are respectively first, second and third prediction parameters of the first set, and said second and third prediction parameters of the second set are estimated by a second regression obtained by solving a second system of equations $|W[n,m] - \theta_w.W[n-1,m]| = \alpha_w + \beta_w|W[n-1,m]|$, where $W_{n-1,m}$ is the value of the West neighbor wavelet coefficient of $W_{n,m}$ and θ_w, α_w and β_w are respectively first, second and third prediction parameters of the second set.

8. Method according to Claim 7, characterized in that said first and second systems of equations are solved by the least squares method.

9. Method according to any one of Claims 1 to 8, characterized in that

a neighbor quantified wavelet coefficient of null value is replaced by a product of the quantifying increment used during the quantifying step and a selected constant strictly greater than zero and less than or equal to one (1).

10. Method according to Claim 9, characterized in that said constant is made equal to 1/3.

11. Method according to any one of Claims 1 to 10, characterized in that, in the entropic coding step, after predicting said esperance and said width, the Laplace function is discretized.

12. Method according to any one of Claims 1 to 10, characterized in that, in the entropic coding step, said iterative coding follows predicting said esperance and said width.

13. Device (D) for compressing digital image data by wavelet transformation, comprising processing means (PM) having a module (M1) for transforming digital image data into wavelet coefficients distributed in sub-bands, a module (M3) for quantifying wavelet coefficients, and a module (M4) for entropically coding the quantified wavelet coefficients, characterized in that said processing means (PM) further comprise an estimator module (M2), adapted to estimate for each coefficient of each sub-band of the image first and second sets of prediction parameters respectively associated with "North-South" and "West-East" directions as a function of the values of the wavelet coefficients of its North and West neighbors and said entropic coder module (M4) is adapted to determine for each coefficient of each sub-band of the image prediction values of the esperance and the width of a Laplace-type function representative of its probability density as a function of said first and/or second set of prediction parameters and of the quantified wavelet coefficient of its North neighbor or its West neighbor and to code said quantified wavelet coefficients entropically using said determined associated esperances and widths.

14. Device according to Claim 13, characterized in that, when it is possible, said entropic coder module (M4) determines for the Laplace function of each quantified wavelet coefficient North and West esperance prediction values and North and West width prediction values, said North, respectively West, esperance prediction value being defined by the product of a first prediction parameter of the first, respectively second, set and the value of said North, respectively West, neighbor quantified wavelet

coefficient, and said North, respectively West, width prediction value, being defined by the sum of a second prediction parameter of the first, respectively second, set and the product of a third prediction parameter of the first, respectively second, set and the absolute value of said North, respectively West, neighbor quantified wavelet coefficient.

15. Device according to Claim 14, characterized in that said entropic coder module (M4), in the absence of a North neighbor coefficient, makes the esperance and width prediction values of the Laplace function identical to the West esperance and West width prediction values, in the absence of a West neighbor coefficient, makes the esperance and width prediction values of the Laplace function equal to the North esperance and North width prediction values, in the absence of West and North neighbor coefficients, effects fixed Laplace coding, and, in the presence of West and North neighbor coefficients, makes the esperance and width prediction values of the Laplace function respectively equal to the half-sum of the North and West esperance prediction values and to the half-sum of the North and West width prediction values.

16. Device according to any one of Claims 13 to 15, characterized in that said estimator module (M2) estimates the prediction values of said first and second sets by regression.

17. Device according to Claim 14 in combination with Claim 16, characterized in that said estimator module (M2) estimates said first prediction parameters of the first and second sets by a first regression obtained by solving a first equation $W[n+1,m] = \theta.W[n,m]$ where $W[n,m]$ is the value of a wavelet coefficient, $W[n+1,m]$ is the value of the neighbor wavelet coefficient $W[n,m]$, and θ is a first prediction parameter.

18. Device according to Claim 17, characterized in that said estimator module (M2) solves said first equation by the least squares method, said first prediction parameter of a first or second set being equal to the ratio between the non-normalized covariance and variance of the values of the wavelet coefficients associated with the first or second set.

19. Device according to Claim 14 in combination with any one of Claims 16 to 18, characterized in that said estimator module (M2) estimates said second and third prediction parameters of the first set by a second regression obtained by solving a first system of equations $|W[n,m] - \theta_N.W[n,m-$

$1]| = \alpha_N + \beta_N|W[n,m-1]|$, where W[n,m] is the value of a wavelet coefficient, $W_{n,m-1}$ is the value of the North neighbor wavelet coefficient of $W_{n,m}$, and θ_N, α_N and β_N are respectively first, second and third prediction parameters of the first set, and estimates said second and third prediction parameters of the second set by a second regression obtained by solving a second system of equations $|W[n,m] - \theta_W.W[n-1,m]| = \alpha_W + \beta_W|W[n-1,m]|$, where $W_{n-1,m}$ is the value of the West neighbor wavelet coefficient of $W_{n,m}$, and θ_W, α_W and β_W are respectively first, second and third prediction parameters of the second set.

20. Device according to Claim 19, characterized in that said estimator module (M2) solves said first and second systems of equations by the least squares method

21. Device according to any one of Claims 13 to 20, characterized in that said entropic coding module (M4), in the presence of a neighbor quantified wavelet coefficient of null value, replaces it by a product of the quantifying increment used during the quantifying step and a selected constant strictly greater than zero and less than or equal to one (1).

22. Device according to Claim 21, characterized in that said constant is made equal to 1/3.

23. Device according to any one of Claims 13 to 22, characterized in that said entropic coder module (M4), after predicting said esperance and said width, discretizes the Laplace function.

24. Device according to any one of Claims 13 to 22, characterized in that said entropic coding module (M4), after predicting said esperance and said width, proceeds to said iterative coding.

25. Digital image data codec, characterized in that it comprises a compressor (D) according to any one of Claims 13 to 24.

26. Method according to Claim 1, characterized in that it enables real-time bit rate regulation by implementing a bit rate scheduling algorithm of the "with bit rate assignment" type consisting in leaving a scheduling module to select independently the quantifying increments used during quantifying the various sub-bands so that the coder bit rate is equal to a bit rate set point and to select how the bit rate should be divided between the various sub-bands.

27. Method according to Claim 1, characterized in that it enables real-time bit rate regulation by implementing a bit rate scheduling algorithm of the "with pure bit rate assignment" type consisting in linking the quantifying

increments of the various sub-bands, which are generally identical, a scheduling module merely selecting the single quantifying increment for all the sub-bands that will enable a fixed set point bit rate to be achieved.